

REMARKS

The Office Action mailed March 7, 2005, has been received and reviewed. Claims 1 through 14 are currently pending in the application, of which claims 1 through 3, and 12 through 14 are currently under examination. Claims 4 through 11 are withdrawn from consideration as being drawn to a non-elected invention. Claims 1 through 3, and 12 through 14 stand rejected. Claim 1 has been amended herein. Applicant respectfully requests reconsideration of the application considering the amendments and arguments set forth herein.

Supplemental Information Disclosure Statement

Please note that a Supplemental Information Disclosure Statement was filed herein on January 24, 2005, and that no copy of the PTO/SB/08A was returned with the outstanding Office Action. Applicant respectfully requests that the information cited on the PTO/SB/08A be made of record herein. For the sake of convenience, a second copy of the January 24, 2005, Supplemental Information Disclosure Statement, PTO/SB/08A, and USPTO date-stamped postcard are enclosed herewith. It is respectfully requested that an initialed copy of the PTO/SB/08A evidencing consideration of the cited references be returned to the undersigned attorney.

Request to Identify Claim Limitations by Reference Numeral

Applicant acknowledges the Examiner's request to identify claim limitations by reference numeral and has elected to do so as a courtesy to the Examiner and not as a representation or admission that the invention, as claimed, is limited to the illustrated embodiments or that any equivalents to the elements of the invention as claimed are forfeited or truncated.

Claims 1 through 14 are reproduced below with reference numerals inserted and, where applicable, by exemplary drawing figure number.

1. (Generic) A method for forming an interposer substrate, comprising:
providing a rectangular substantially planar substrate (20) comprising a dielectric material;
forming an elongated interconnect slot (40) comprising a plurality of longitudinally adjacent segments (40A, 40B, 40C) separated by at least one transversely extending crosspiece

(70), the elongated interconnect slot being sized and configured for alignment with bond pads (34) on a semiconductor die (12) when the semiconductor die is placed on the substantially planar substrate, the bond pads being accessible through the interconnect slot.

2. (See FIG. 4) The method of claim 1, further comprising forming the interconnect slot (40) by milling through the substrate (20) and the at least one transversely extending crosspiece (70) comprises at least one unmilled portion of the substrate (20) lying intermediate opposing ends (44) of the interconnect slot (40).

3. (See FIG. 4) The method of claim 2, further comprising producing filleted side edges on the at least one transversely extending crosspiece (70) during the milling.

4. (See FIG. 5) The method of claim 1, wherein forming the elongated interconnect slot (40) comprises forming a unitary elongated interconnect slot (40) and forming the at least one transversely extending crosspiece (70) by bonding a segment of material (70) transversely across the interconnect slot (40) at a location intermediate opposing ends (44) thereof.

5. (See FIG. 5) The method of claim 4, wherein forming the at least one transversely extending crosspiece (70) comprises forming a tape segment coated with an adhesive on opposing sides thereof and adhering the tape segment to a surface (24) of the substantially planar substrate (20).

6. (See FIG. 5A) The method of claim 1, wherein forming the elongated interconnect slot (40) comprises forming a unitary elongated interconnect slot (40), forming an “I”-shaped segment of material (70A) and bonding a head portion of the “I”-shaped segment (70H) to the substrate (20) on one side of the interconnect slot (40) and a foot portion of the “I”-shaped segment (70F) to the substrate (20) on an opposing side of the interconnect slot (40)

with a body portion of the “I”-shaped segment (70B) extending transversely thereacross to form the at least one transversely extending crosspiece (70T).

7. (See FIG. 5A) The method of claim 6, further comprising forming the “I”-shaped segment (70A) as a film having an adhesive coating on opposing sides thereof.

8. (See FIG. 5A) The method of claim 6, further comprising forming the “I”-shaped segment (70A) as a substantially rigid plastic segment.

9. (See FIG. 7) The method of claim 1, wherein forming the elongated interconnect slot (40) comprises forming a unitary elongated interconnect slot (40), forming a “T”-shaped element (70T) having a body (70B) and a cap (70C), extending the body (70B) into the interconnect slot (40) in contact with opposing sides thereof and bonding legs of the cap (70C) extending transversely to the interconnect slot (40) over a surface (22) of the substrate (20) thereto to form the at least one transversely extending crosspiece (70T).

10. (See FIG. 5) The method of claim 1, wherein forming the elongated interconnect slot (40) comprises forming a unitary elongated interconnect slot (40), forming a tape segment (70) of a polymeric material containing a reinforcement material, disposing the tape segment (70) transversely across the interconnect slot (40) and bonding the tape segment (70) to a surface (24) of the substrate (20) .

11. (See FIG. 6) The method of claim 1, wherein forming the elongated interconnect slot (40) comprises forming a unitary elongated interconnect slot (40), interposing a bar (70) of material transversely between opposing sides (46A, 46B) of the interconnect slot (40) and bonding the bar (70) thereto.

12. (Generic) The method of claim 1, further comprising forming the elongated interconnect slot (40) to a length of about 67% or more of a length of the substrate (24).

13. (Generic) The method of claim 12, further comprising forming the elongated interconnect slot (40) to a length of about 70 to 80% of a length of the substrate (24).
14. (Generic to all but FIG. 9A) The method of claim 1, further comprising locating the at least one transversely extending crosspiece (70) substantially at a longitudinal midpoint of the interconnect slot (40).

Amendments to the Specification

The Examiner has reminded the Applicant of the proper content of an abstract of the disclosure, and of the proper language and format for an abstract of the disclosure. Support for the amendment to the abstract of the invention is found in the as-filed application at, for example, claims 1-3, and 12-14, paragraphs [0007], [0012], [0028], [0032], [0033].

The Examiner has required that a new title be provided that is clearly indicative of the invention to which the claims are directed. The title has been amended herein to clearly indicate the invention recited in the claims. Support for the amendment to the title of the invention is found in the as-filed application at, for example, claims 1-3, and 12-14.

Applicant respectfully asserts that the abstract and title of the invention are now in proper form as set specified in the MPEP.

Support for Amendment to Independent Claim 1

Applicant has amended independent claim 1 to include the limitation that the substrate be “rectangular” and “compris[e] a dielectric material.” Furthermore, claim 1 has been amended to include the limitation that “the elongated interconnect slot [be] sized and configured for alignment with bond pads on a semiconductor die when the semiconductor die is placed on the substantially planar substrate, the bond pads being accessible through the interconnect slot.”

Support for the amendment to independent claim 1 is found in the as-filed specification at, for example, paragraphs [0007], [0012], [0028], [0032], [0033], and in FIGS. 4, 5, 5A, 6, 7, 8, and 9A.

Anticipation Rejection Based on U.S. Patent No. 6,370,767 to Solberg et al.

Claims 1, 12 and 14 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Solberg et al. (U.S. Patent No. 6,370,767). Applicant respectfully traverses this rejection, as hereinafter set forth.

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Brothers v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Solberg et al. describe a method for fabricating an electrical apparatus 32 that includes an element 10, a heat sink 30, and a plurality of electrical components 22. *Solberg et al.*, column 7, lines 19-22, column 9, lines 8-10; FIGS. 2, 4, and 6. To fabricate the electrical apparatus 32, a “highly two-dimensional and planar” element 10 “may be formed using, for example, conventional metal stamping techniques.” *Id.* at column 5, lines 63-64, column 6, lines 56-54. This planar element 10 is illustrated in FIG. 1 of Solberg et al. As seen in FIG. 1, the element 10 “includes a frame 12 and several grooves or spacings 14 separating various regions 16....” *Id.* at column 5, lines 61-62. “The element 10 also includes a number of mechanically stabilizing ties 17 connected between the regions 16.” *Id.* at column 6, lines 15-16.

In the outstanding Office Action, the Examiner asserted that Solberg et al. discloses a planar substrate and a crossbar, and attached a copy of FIG. 1 from Solberg et al. The copy of FIG. 1 was annotated to indicate what the Examiner asserts to be a substrate and crossbar as recited in claim 1 of the present invention. The Examiner labeled the frame 12 as a “substrate,” and also labeled a mechanically stabilizing tie 17 connected between regions 16 and spanning a groove or spacing 14 separating those regions 16 as a “midpoint crosspiece.”

Applicant respectfully asserts that Solberg et al. does not expressly or inherently describe a method for forming an interposer substrate as recited in claim 1. In particular, applicant respectfully asserts that the spacings 14 described by Solberg et al. are not “sized and configured for alignment with bond pads on a semiconductor die when the semiconductor die is placed on the substantially planar substrate, the bond pads being accessible through the interconnect slot,” as recited in independent claim 1 as currently amended. The spacings 14 described by Solberg et

al. are not interconnect slots sized and configured for alignment with a row or rows of bond pads on a semiconductor die, but are rather spaces separating the frame 12 from the various regions 16. Solberg at column 5, lines 60-62. Furthermore, Solberg et al. does not describe connecting bond pads on a die to conductive traces on an opposite side of the frame 12 (shown in FIG. 1 of Solberg et al.) by bond wire, for example, which pass through the spacings 14.

Furthermore, Applicant respectfully asserts that Solberg et al. does not expressly or inherently describe a “rectangular substantially planar substrate comprising a dielectric material,” as recited in claim 1 as currently amended. Solberg et al. describes a frame 12 that is made from an “electrically and thermally conductive material such as, for example, copper or aluminum.” Solberg at column 5, lines 65-66; *see also* column 6, lines 51-56. For this additional reason, Solberg et al. does not describe a method for forming an interposer substrate as recited in claim 1 as currently amended.

For each of the reasons set forth above, Applicant respectfully asserts that Solberg et al. does not describe a method for forming an interposer substrate as recited in independent claim 1. Therefore, Applicant asserts that independent claim 1 is not anticipated by Solberg et al. and respectfully requests that the Examiner withdraw the rejection under 35 U.S.C. § 102(b) of claim 1.

Regarding claims 12 and 14, Applicant respectfully asserts that each of dependent claims 12 and 14 are not anticipated by Solberg et al. because each of claims 12 and 14 depends directly from independent claim 1, which is not anticipated by Solberg et al. for the reasons set forth above.

Furthermore, Applicant respectfully asserts that Solberg et al. does not describe “forming an elongated interconnect slot to a length of about 67% or more of a length of [a] substrate,” as recited in dependent claim 12. Applicant respectfully asserts that even assuming for purposes of argument that the spacings 14 are interconnect slots, Solberg et al. does not describe a length of the spacings 14 shown and described therein. Therefore, Applicant asserts that dependent claim 12 is not anticipated by Solberg et al. for this additional reason, and respectfully requests that the Examiner withdraw the rejection under 35 U.S.C. § 102(b) of claim 12.

Additionally, Applicant asserts that Solberg et al. does not describe “locating at least one transversely extending crosspiece substantially at a longitudinal midpoint of the interconnect

slot,” as recited in dependent claim 14. Applicant respectfully asserts that Solberg et al. does not describe a midpoint of the spacings 14 shown and described therein. Therefore, Applicant asserts that dependent claim 14 is not anticipated by Solberg et al. for this additional reason, and respectfully requests that the Examiner withdraw the rejection under 35 U.S.C. § 102(b) of claim 14.

For each of the reasons set forth above, Applicant respectfully requests that the Examiner withdraw the rejections under 35 U.S.C. § 102(b) of claims 1, 12, and 14.

35 U.S.C. § 103(a) Obviousness Rejections

Obviousness Rejection Based on U.S. Patent No. 6,370,767 to Solberg et al. in view of U.S. Patent No. 5,597,643 to Weber

Claim 2 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Solberg et al. (U.S. Patent No. 6,370,767) in view of Weber (U.S. Patent No. 5,597,643). Applicant respectfully traverses this rejection, as hereinafter set forth.

M.P.E.P. 706.02(j) sets forth the standard for a Section 103(a) rejection:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, **the prior art reference (or references when combined) must teach or suggest all the claim limitations.** The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant’s disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). (Emphasis added).

The 35 U.S.C. § 103(a) obviousness rejections of claim 2 is improper because the teachings of Solberg et al. and Weber, when considered together, do not teach or suggest all the claim limitations set forth in dependent claim 2.

Weber teaches a multi-tier laminate substrate for use in electronic device packaging. The laminate substrate includes many layers. *Weber*, column 6, lines 52-54; FIG. 1. Windows are formed in some of the layers. *Id.* at column 7, lines 31-34. Weber teaches that one method for forming the windows in the layers “consists of routing out windows...using a milling bit.” *Id.* at

column 7, lines 55-60; *see* FIG. 8.

Applicant respectfully asserts that Solberg et al. and Weber, considered together, do not teach or suggest a method for forming an interposer substrate as recited in claim 2. In particular, applicant respectfully asserts that neither Solberg et al. nor Weber teach or suggest the claim limitation of “forming an elongated interconnect slot... [that is] sized and configured for alignment with bond pads on a semiconductor die when the semiconductor die is placed on the substantially planar substrate, the bond pads being accessible through the interconnect slot,” as recited in independent claim 1 as currently amended, from which claim 2 directly depends. As discussed previously herein, the spacings 14 described by Solberg et al. are not interconnect slots as recited in independent claim 1. Furthermore, the windows taught by Weber are not interconnect slots as recited in independent claim 1. Applicant respectfully asserts that the windows taught by Weber are larger in size than the entire semiconductor chip 50. *See Weber*, FIGS. 6, 7, and 10. Applicant respectfully asserts that the windows cannot be considered to be sized and configured for alignment with a row or rows of bond pads on a die. Therefore, Applicant asserts that Weber does not teach or suggest an interconnect slot as recited in claim 1.

For the reasons set forth above, Applicant respectfully asserts that Solberg et al. and Weber do not teach or suggest all of the limitations recited in dependent claim 2 when considered together, and that the Examiner has not established a *prima facie* case of obviousness. Therefore, Applicant respectfully requests that the Examiner withdraw the rejection under 35 U.S.C. § 103(a) of claim 2.

Obviousness Rejection Based on U.S. Patent No. 6,370,767 to Solberg et al. in view of U.S. Patent No. 3,635,124 to Parsons

Claim 3 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Solberg et al. (U.S. Patent No. 6,370,767) in view of Parsons (U.S. Patent No. 3,635,124). Applicant respectfully traverses this rejection, as hereinafter set forth.

The 35 U.S.C. § 103(a) obviousness rejections of claim 3 is improper because the teachings of Solberg et al. and Parsons, when considered together, do not teach or suggest all the claim limitations set forth in dependent claim 3.

Parsons teaches a method of using a tape-controlled milling machine to carve

combustible casting patterns in expanded polystyrene material. *See, e.g., Parsons*, column 2, lines 28-33. The milling machine utilized is a conventional steel milling machine. *Id.* at column 2, lines 60-61. The speed of the milling machine is adjusted so that the rate of material removal for the expanded polystyrene material “will bear substantially the same ratio to the rate of material removed for steel as the density of steel bears to the density of the polystyrene pattern material.” *Id.* at column 2, lines 70-75. Using this method, the rate of polystyrene material removal may be at least 100 times as great as the rate at which the machine is designed to remove steel. *Id.* at column 3, lines 4-6. Parsons teaches the use of the method to mill a particular combustible casting pattern 10 shown in FIG. 2. The casting pattern 10 has a “hollow boxlike shape,” and includes a square cut end wall 11 and parallel sidewalls 12. *Id.* at column 2, lines 32-34. The pattern also has a bottom wall 15 including cutouts 16. *Id.* at column 2, lines 36-38. In the particular embodiment shown in the Figures, a plurality of cavities is formed in the pattern 10 by crosswebs 21. *Id.* at column 2, lines 41-43. Parsons teaches that many edges of the pattern 10 may be filleted, including the corner fillets 39 at the edges along the juncture between the crosswebs 21 with the sidewalls 12. *See, e.g., Id.* at column 3, line 35.

Applicant respectfully asserts that Solberg et al. and Parsons, considered together, do not teach or suggest a method for forming an interposer substrate as recited in claim 3. In particular, Applicant respectfully asserts that neither Solberg et al. nor Parsons teach or suggest the claim limitation of “forming an elongated interconnect slot...[that is] sized and configured for alignment with bond pads on a semiconductor die when the semiconductor die is placed on the substantially planar substrate, the bond pads being accessible through the interconnect slot,” as recited in independent claim 1 as currently amended, from which claim 3 directly depends. As discussed previously herein, the spacings 14 described by Solberg et al. are not interconnect slots as recited in independent claim 1. Furthermore, the cavities formed in the pattern 10 by crosswebs 21 taught by Parsons are not interconnect slots as recited in independent claim 1. Applicant respectfully asserts that the cavities formed in the pattern 10 by crosswebs 21 taught by Parsons are not interconnect slots that are sized and configured for alignment with bond pads on a semiconductor die. Therefore, Applicant asserts that Parsons does not teach or suggest a method for forming an interposer substrate as recited in claim 1 as currently amended.

For the reasons set forth above, Applicant respectfully asserts that Solberg et al. and

Parsons do not teach or suggest all of the limitations recited in dependent claim 3 when considered together, and that the Examiner has not established a *prima facie* case of obviousness. Therefore, Applicant respectfully requests that the Examiner withdraw the rejection under 35 U.S.C. § 103(a) of claim 3.

Furthermore, Applicant asserts that there is no suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to combine the teachings of Parsons with those of Solberg et al. Applicant respectfully asserts that providing fillets such as the corner fillets 39 taught by Parsons on the ties 17 taught by Parsons would not render the ties 17 easier to break, as asserted by the Examiner in the outstanding office action.

Parsons does not teach or suggest a motive for providing the fillets in the casting pattern 10 or an advantage in providing the fillets. Parsons does imply that the method described therein facilitates formation of fillets. Parsons teaches that at the time the invention described therein was made, “[t]he amount of work necessary to form an arcuate fillet [was] considered prohibitive.” *Parsons*, column 1, lines 37-38. In other words, Parsons teaches a method for facilitating the fabrication of fillets in polystyrene combustible casting patterns, but does not teach a motive for providing fillets in polystyrene material.

For each of the reasons set forth above, Applicant respectfully asserts that Solberg et al. and Parsons do not teach or suggest all of the limitations recited in dependent claim 3 when considered together, and that the Examiner has not established a *prima facie* case of obviousness. Therefore, Applicant respectfully requests that the Examiner withdraw the rejection under 35 U.S.C. § 103(a) of claim 3.

Obviousness Rejection Based on U.S. Patent No. 6,370,767 to Solberg et al.

Claim 13 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Solberg et al. (U.S. Patent No. 6,370,767). Applicant respectfully traverses this rejection, as hereinafter set forth.

The 35 U.S.C. § 103(a) obviousness rejections of claim 13 is improper because Solberg et al. does not teach or suggest all the claim limitations set forth in dependent claim 13. As discussed previously herein, Solberg et al. does not teach or suggest the claim limitation of

“forming an elongated interconnect slot...[that is] sized and configured for alignment with bond pads on a semiconductor die when the semiconductor die is placed on the substantially planar substrate, the bond pads being accessible through the interconnect slot,” as recited in independent claim 1 as currently amended, from which claim 13 indirectly depends. As discussed previously herein, the spacings 14 described by Solberg et al. are not interconnect slots as recited in independent claim 1. Furthermore, Applicant respectfully asserts that Solberg et al. does not teach or suggest a length of the spacings 14 shown and described therein.

For these reasons, Applicant respectfully asserts that Solberg et al. does not teach or suggest all of the limitations recited in dependent claim 13, and that the Examiner has not established a *prima facie* case of obviousness. Therefore, Applicant respectfully requests that the Examiner withdraw the rejection under 35 U.S.C. § 103(a) of claim 13.

CLAIM GENERICITY

Six species of invention have been identified in the present application:

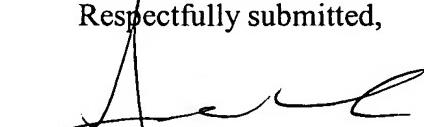
- Species 1: Fig. 4;
- Species 2: Fig. 5;
- Species 3: Fig. 5A;
- Species 4: Fig. 6;
- Species 5: Fig. 7; and
- Species 6: Fig. 9A.

Applicant considers claims 1, 12, and 13 to be generic. Furthermore, claim 14 is generic to all species except Species 6. Applicant notes that upon allowance of a generic claim, claims depending therefrom to a non-elected species would also be allowable.

CONCLUSION

Claims 1 through 14 are believed to be in condition for allowance, and an early notice thereof is respectfully solicited. Should the Examiner determine that additional issues remain which might be resolved by a telephone conference, he is respectfully invited to contact Applicant's undersigned attorney.

Respectfully submitted,



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